



A Regional MARKAL Model for New England

Gary Kleiman

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The Clean Air Association of the Northeast States



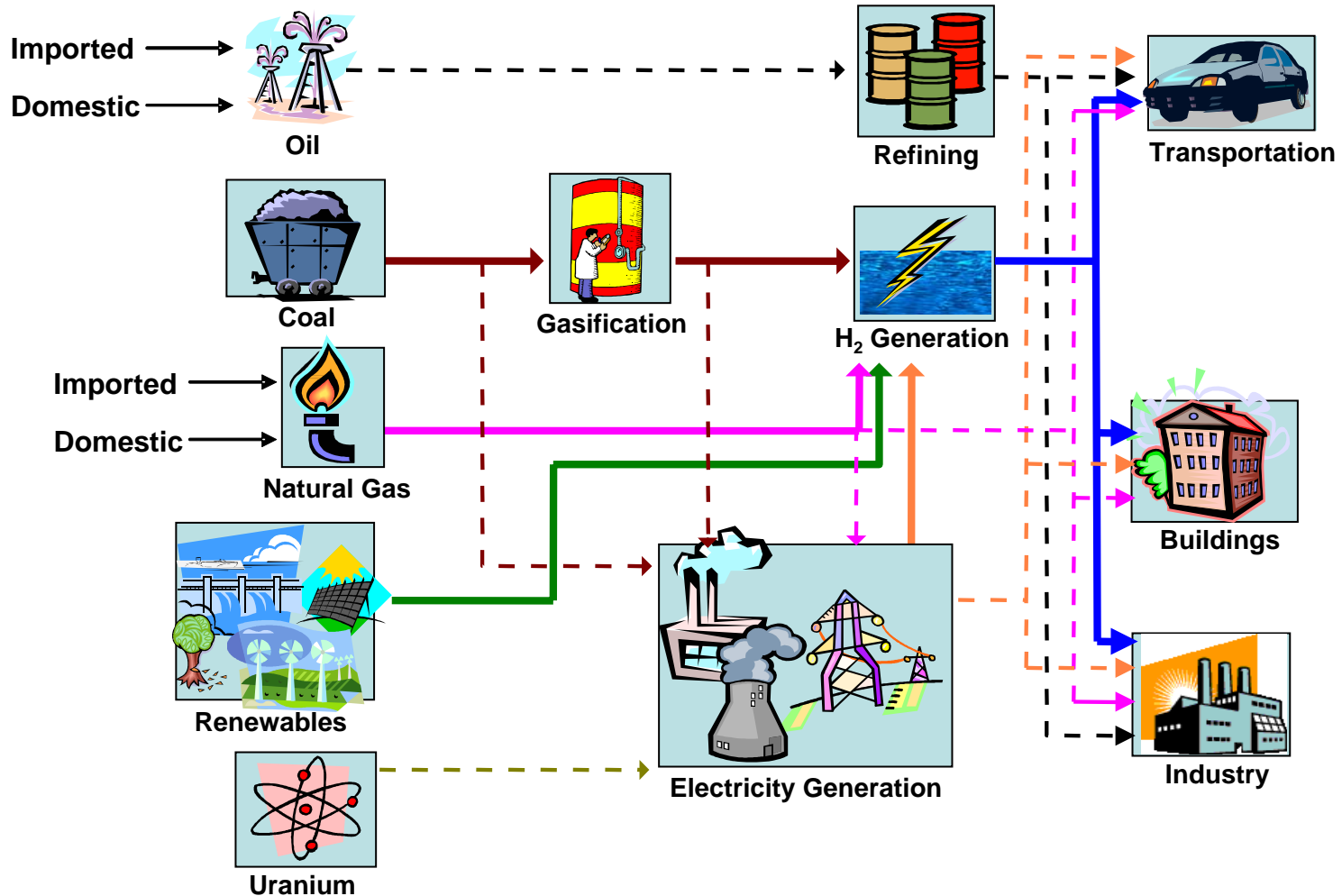
Energy/Economic Modeling Rationale

- There is a tremendous need for sound energy & air quality planning at the state and regional level:
 - Combustion is a major source of precursors to tropospheric ozone and particulate matter (PM)
 - State Implementation Plans (SIPs) for criteria pollutant control are due in 2007/2008
- A variety of state and regional actions are possible:
 - Transportation measures such as feebates, emissions standards
 - Renewable portfolio standards
- Important to evaluate and understand implications
 - Multi-pollutant
 - Cross-sector interactions
 - Economic impacts

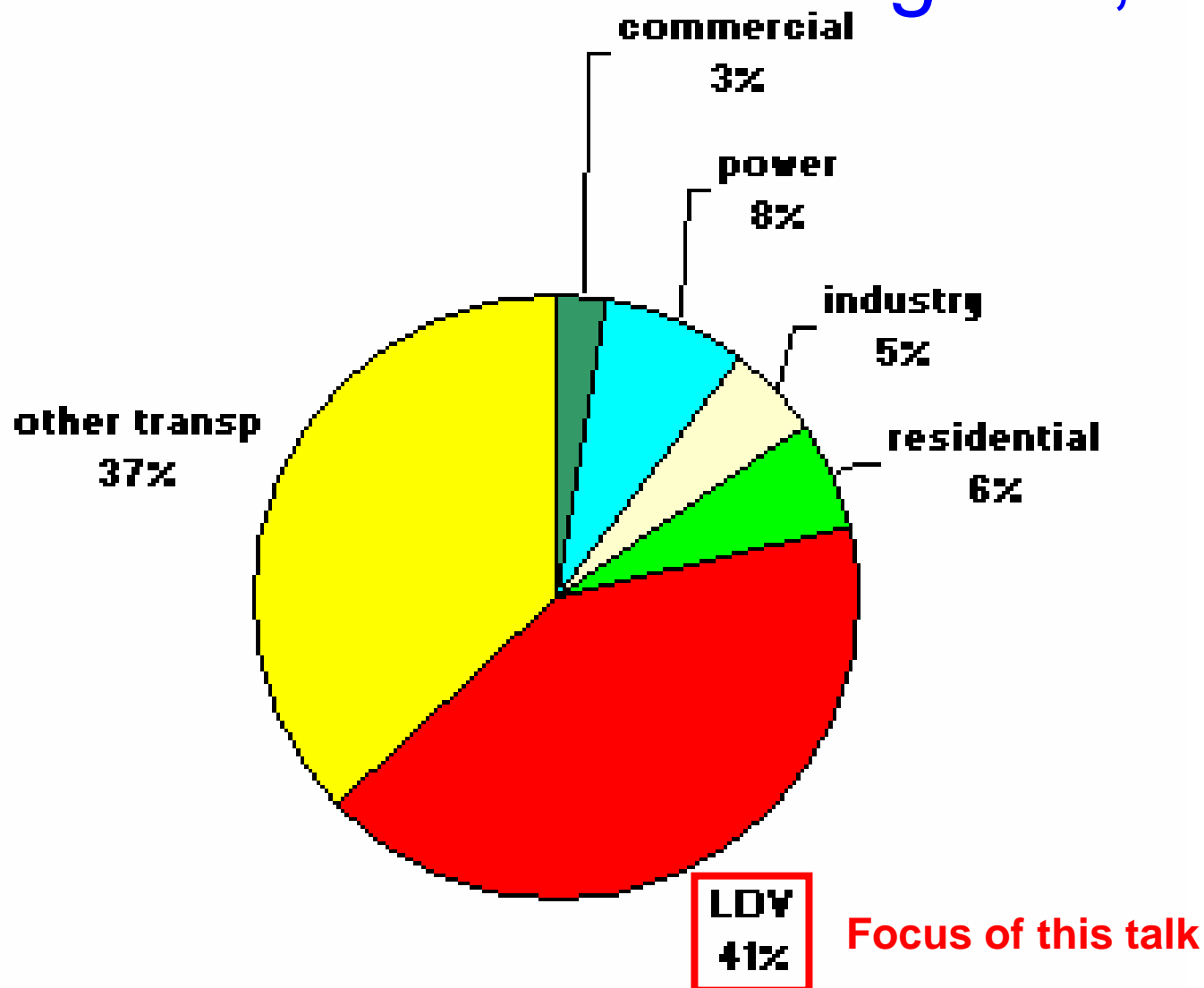


NE-MARKAL Modeling of Energy System

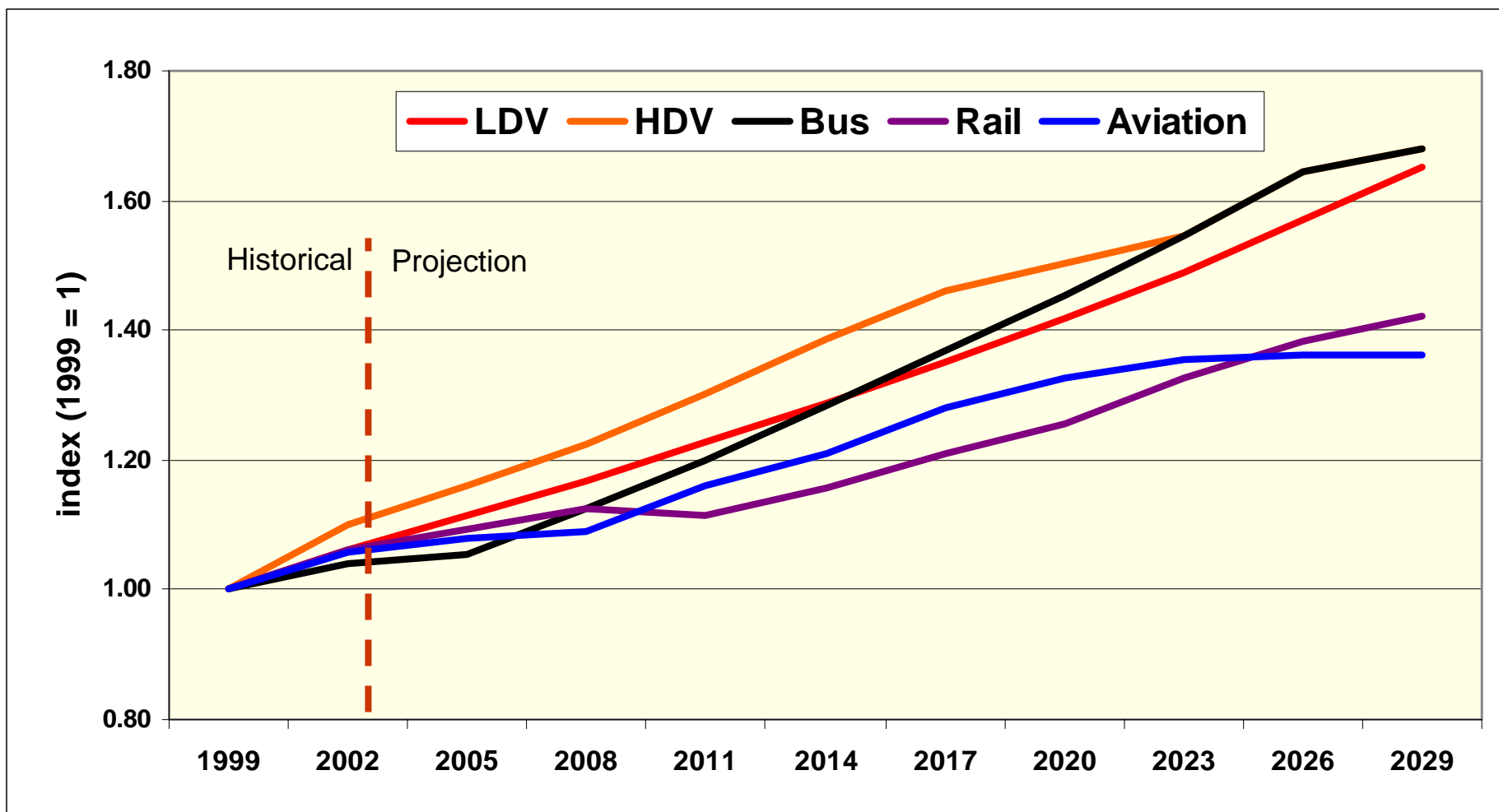
Energy System Interactions



Sources of NO_x in New England, 2002



New England Transportation Demand Projection



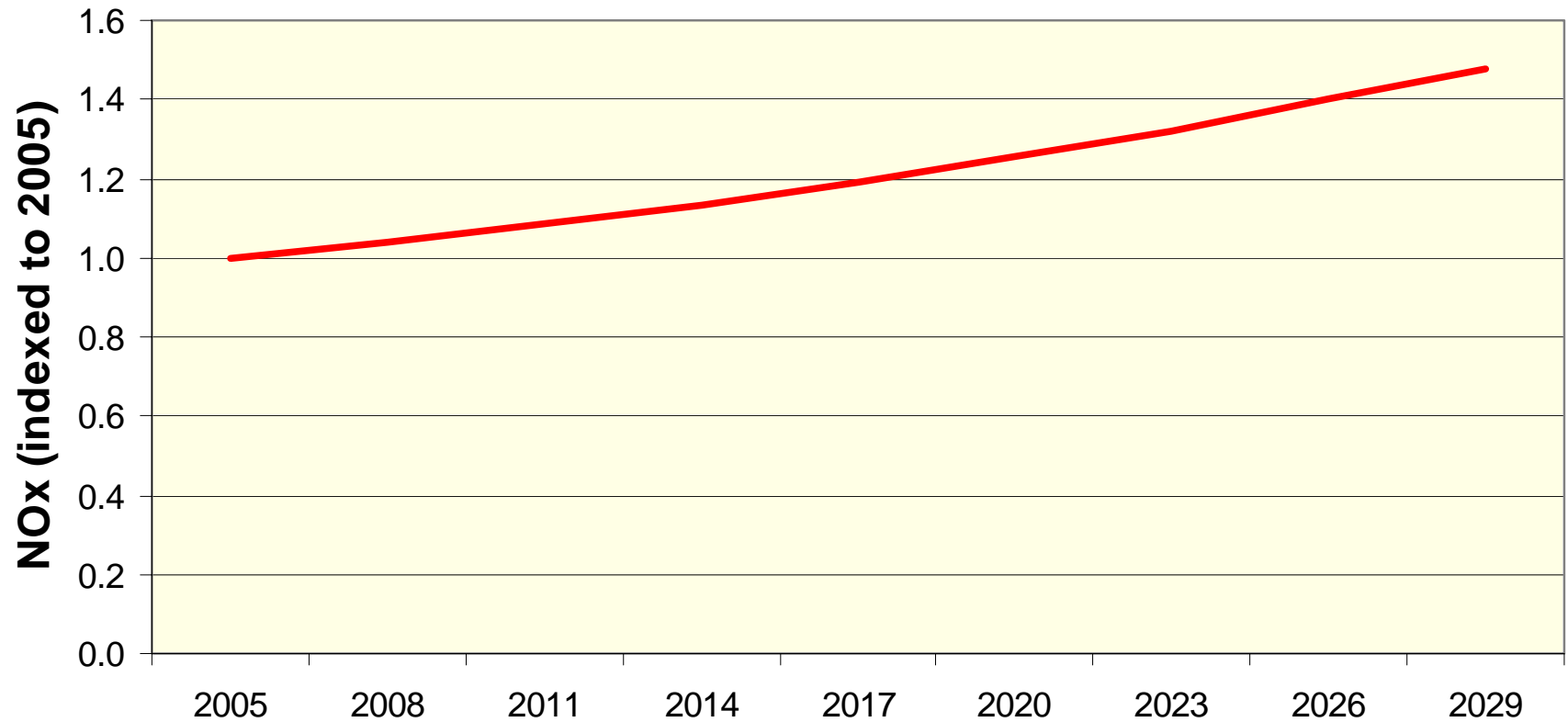
Sources:

Historical record: State department of transportation officials (VMT), FTA - National Transit Database, ORNL Transportation Energy Data Book

Projection: NEEP – Economic Outlook 2004~2008, EIA – Annual Energy Outlook 2005

Light Duty NO_x Projections

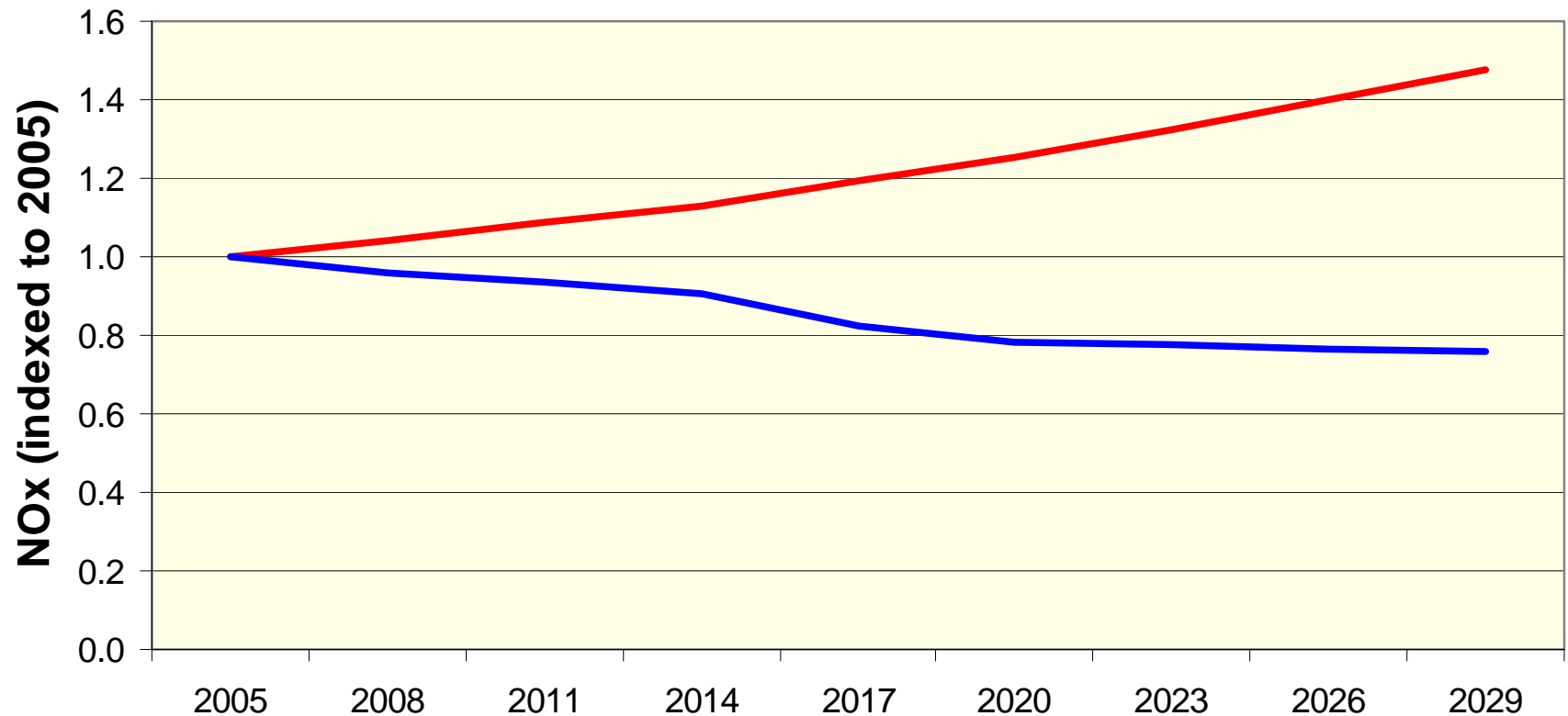
Fixed Technology



Light Duty NO_x Projections

Fixed Technology

Technological Evolution



Light Duty NO_x Projections

Fixed Technology

Technological Evolution

Technological Potential



Can we improve auto efficiency through state or regional vehicle efficiency improvement programs (i.e. feebates)?

- Fee on conventional technologies, rebate on cleaner technologies (hybrid, FCV, etc)
- Revenue neutral: amounts to redistribution of capital costs from less efficient to more efficient vehicles

- Benef
- techno

Example:

Vehicle Type

MPG

Fee/Rebate

- NESO

Large SUV

13

(\$3,290)

passed

Large 2WD Pickup

18

(\$1,150)

2008.

Mid-size Family Sedan

24

\$ 140

Car-Based Hybrid SUV

31

\$1,180

- Pivot

Compact Sedan

33

\$1,370

- Rate:

Compact Hybrid

47

\$2,280

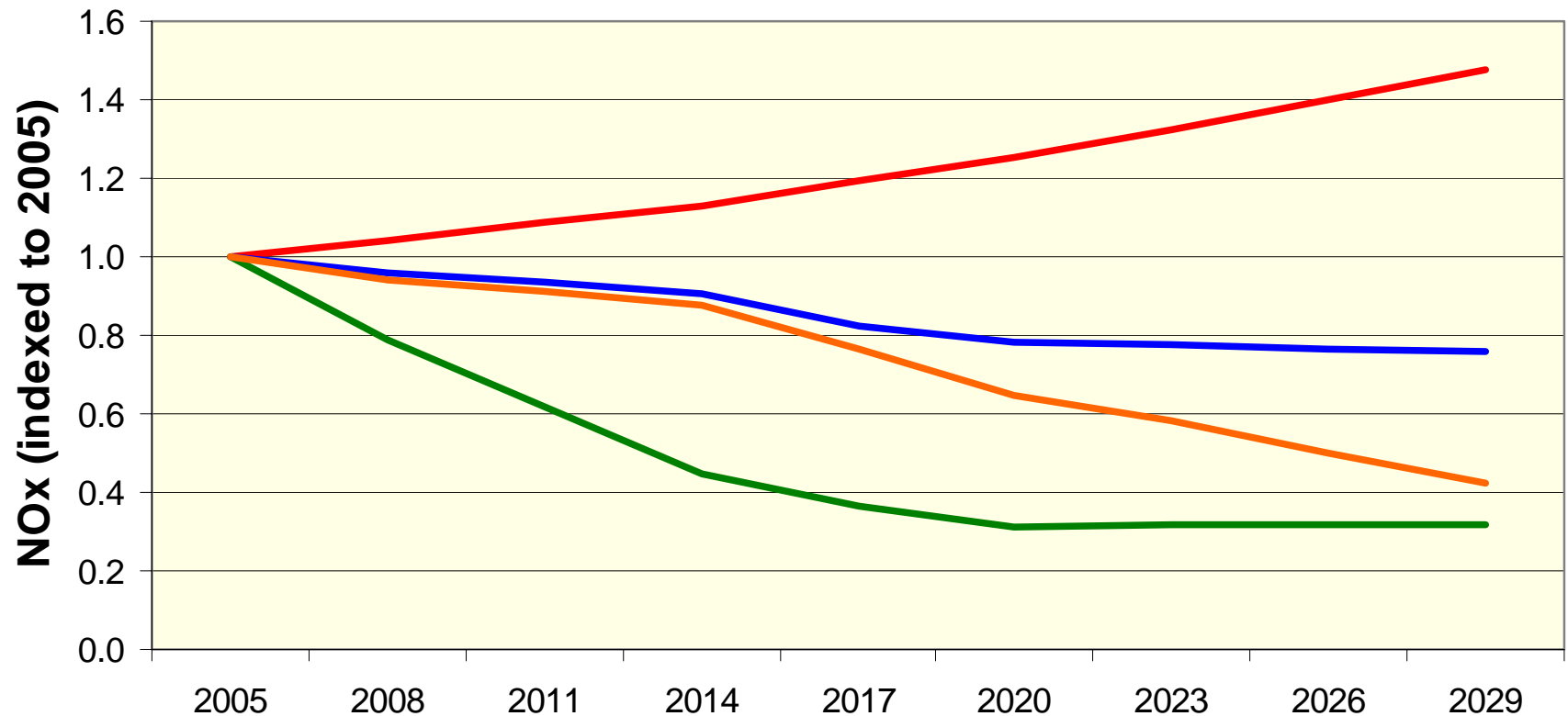
Light Duty NO_x Projections

Fixed Technology

Technological Evolution

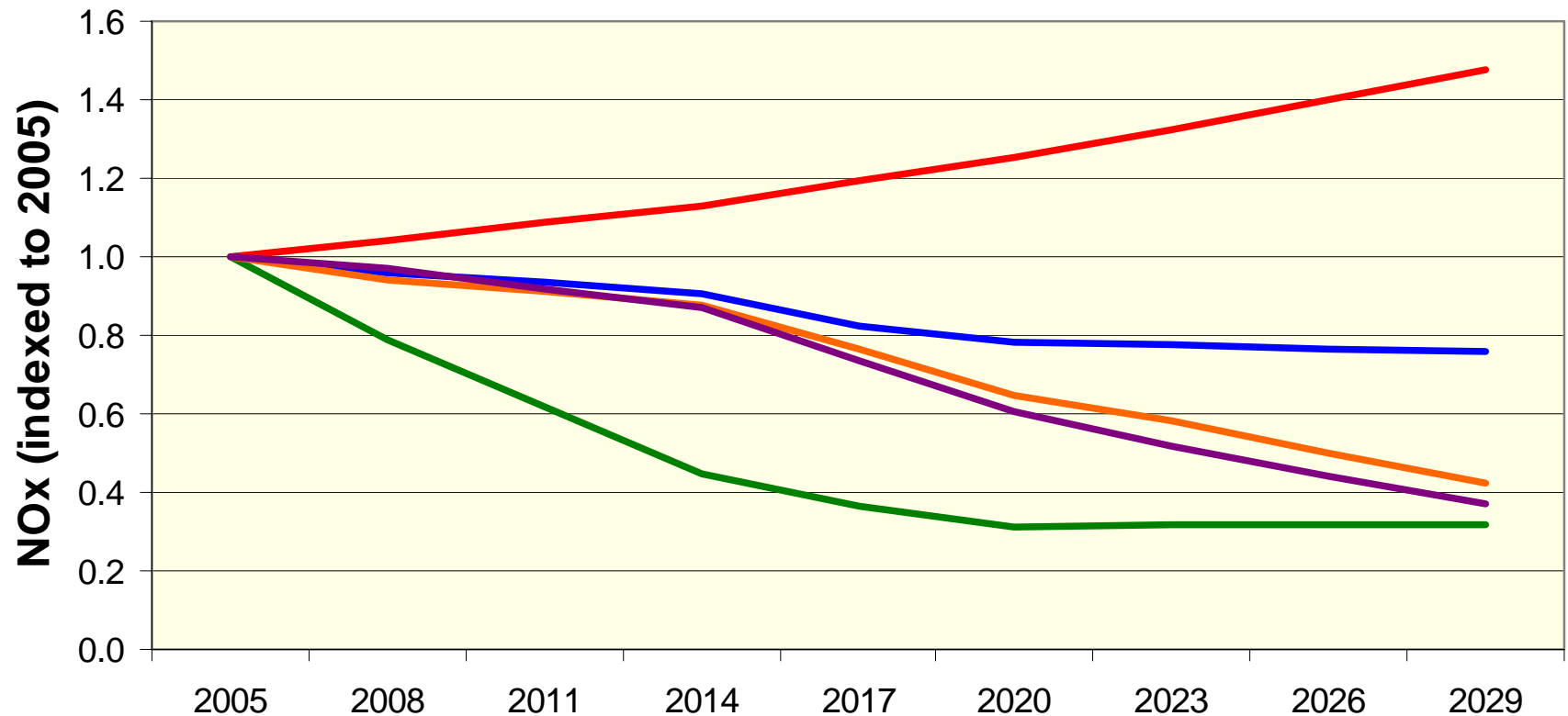
Technological Potential

Feebate (\$1000/PG100M)



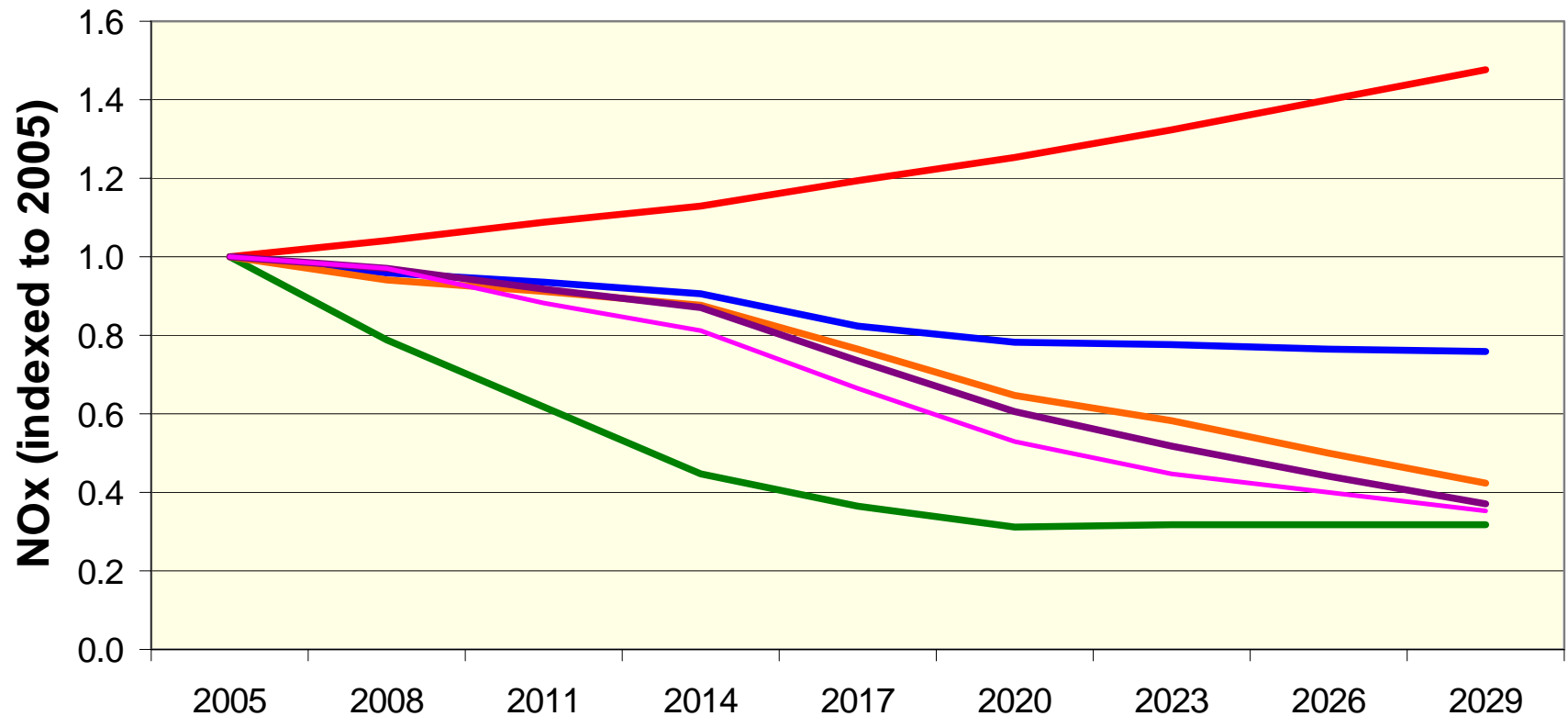
Light Duty NO_x Projections

- Fixed Technology
- Technological Evolution
- Technological Potential
- Feebate (\$1000/PG100M)
- Feebate (\$2000/PG100M)

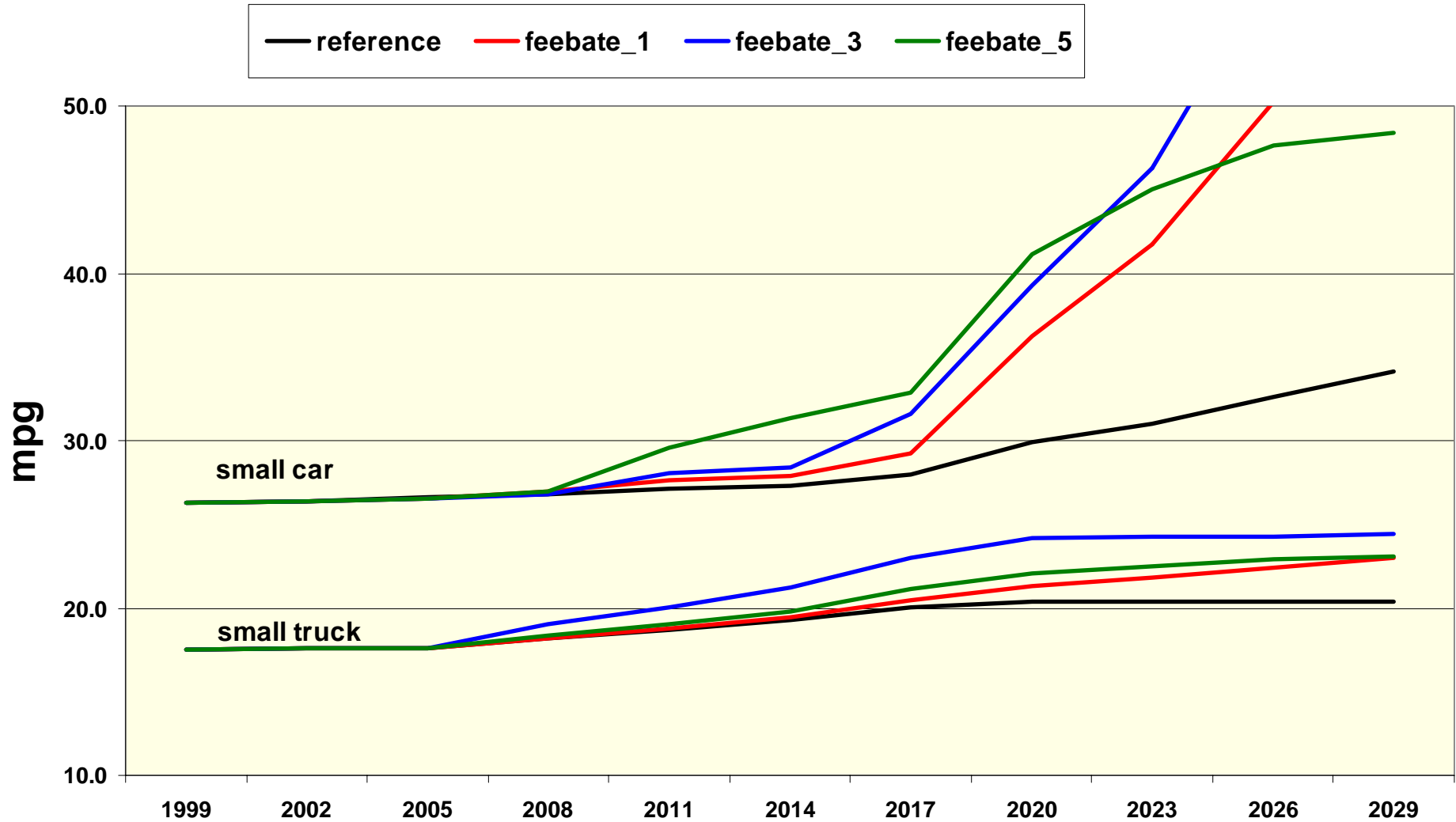


Light Duty NO_x Projections

- Fixed Technology
- Technological Evolution
- Technological Potential
- Feebate (\$1000/PG100M)
- Feebate (\$2000/PG100M)
- Feebate (\$3000/PG100M)



Induced Technology Change



Regional plans to be evaluated

- Smart growth tax credit to reduce VMT
- Regional feebate programs
- Low-sulfur heating oil
- Renewable Portfolio Standards
- Combined Heat and Power (CHP) incentive programs



Conclusions

- NE-MARKAL allows for the analysis and quantification of expected economic and environmental benefits of regional programs plus a description of the technology path to get there

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